

The growing awareness of more robust designs, advanced release indicators and corrosion resistance for relief valves and manifolds have helped project the industry forward by increasing safety features on mission-critical components.



**We are all consumers of technology innovations. Why should pressure-relief valves and three-way manifolds be any different?**

By Angelo Turco, Cyrus Shank

**M**ore robust and corrosion-resistant designs are increasing the safety and performance of safety-relief valves. The manufacturing and applications for relief valves and manifolds are continuously

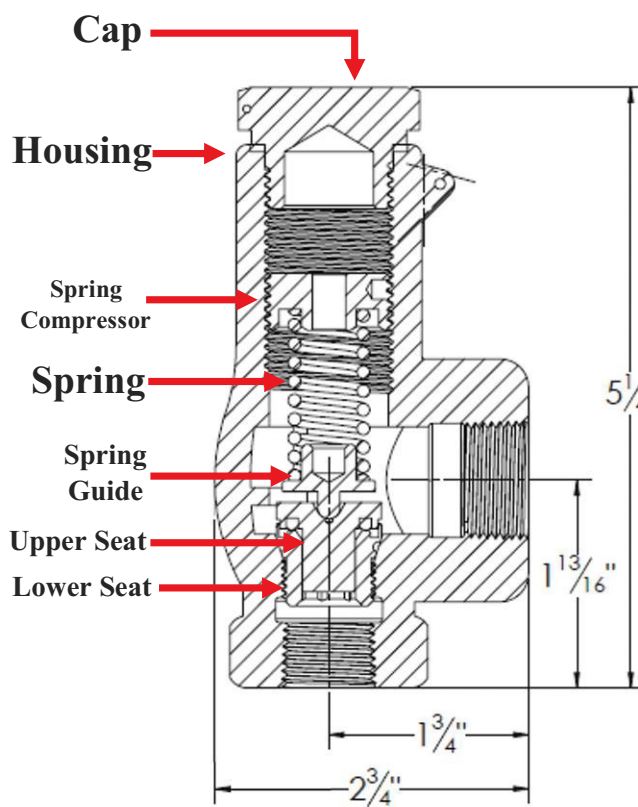
improving. The growing awareness of more robust designs, advanced release indicators and corrosion resistance have helped project the industry forward by increasing safety features on mission-critical components.

Over the past several years, there has been an expansion on code requirements for end users and an increase of safety regulations for everyone. This has increased the pressure on valve manufacturers to evolve, adapt and provide solutions to these constantly growing demands. This article will discuss previous iterations of relief valves as well as the improvements made to modern relief valves and three-way manifolds.

The central focus for valve manufacturers is to design the safest product in the industry. With that competitive thought, it has forced companies to become more creative in how they innovate new angles on a product that has been around for multiple decades. Curiously, most internal components in standard valve designs are similar between manufacturers. Most inlets and outlets on relief valves and manifolds will have either male or female national pipe taper (NPT) connections. NPT is designed to use a wedging action to create a complete thread engagement without threading past the vanish point.

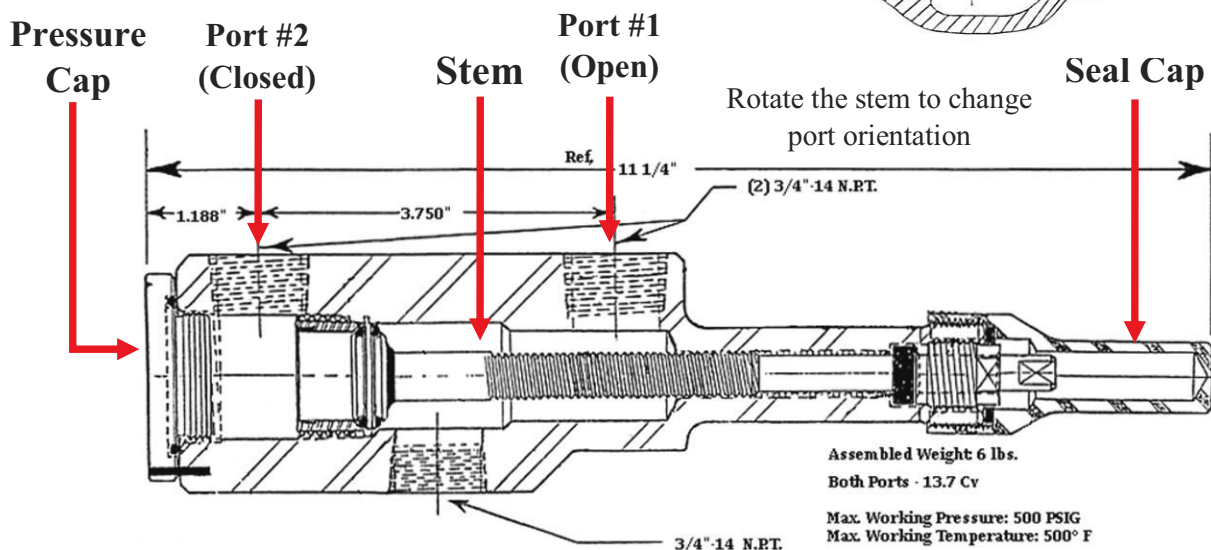
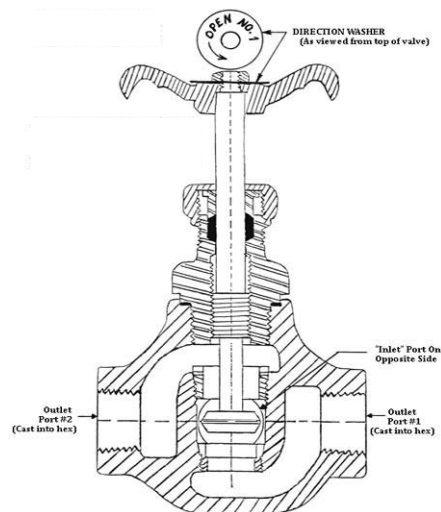
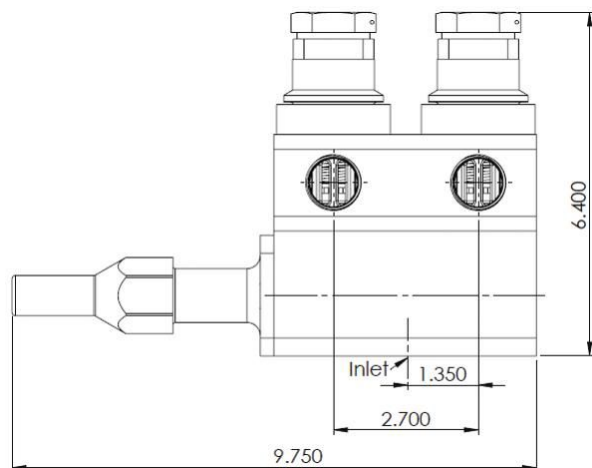
Due to the manufacturing design of an NPT, these connections should be used just once. After one use, the connection will have to be threaded in more, potentially damaging internal components. Depending on the material, most manufacturers offer weldable connections to their products. This helps create a better seal and less piping hassle when replacing relief valves or manifolds.

The next potential area for innovation is regarding internal components. Each manufacturer has their own separate design, but the component function is



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relatively the same for both relief valves and manifolds. Valves are designed to have seats, spring guides, springs and spring compressors. The purpose of the seats is to help create a seal from the inlet pressure while determining the flow if the relief valve releases. Most modern seats are constructed from stainless steel and use Teflon to create a seal. The spring guide is used to balance the spring while creating equal pressure on the upper seat, and the spring is used to determine the set pressure of the relief valve. The spring compressor is designed to compress the spring to the



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correct set pressure.

With a fully assembled relief valve, the vapor, or liquid, will rest against the seat, until enough force is built up to relieve pressure. Relief valves are intended to reseal but should be replaced after a relief valve has been activated. This is due to the unpredictability of a release. One of the biggest variables justifying replacement is whether an object may become lodged in the seat upon release, damaging it so that

the relief valve is consistently weeping.

In this case, best practice requires that a technician rotate the manifold to isolate the relief valve that was released and replace that valve immediately.

Manifolds are much simpler in terms of the internal components. The stem, the only main component in the manifold, dictates which port is open. There are a few different manifolds in the market, so be sure to check with the manufacturer to ensure which relief

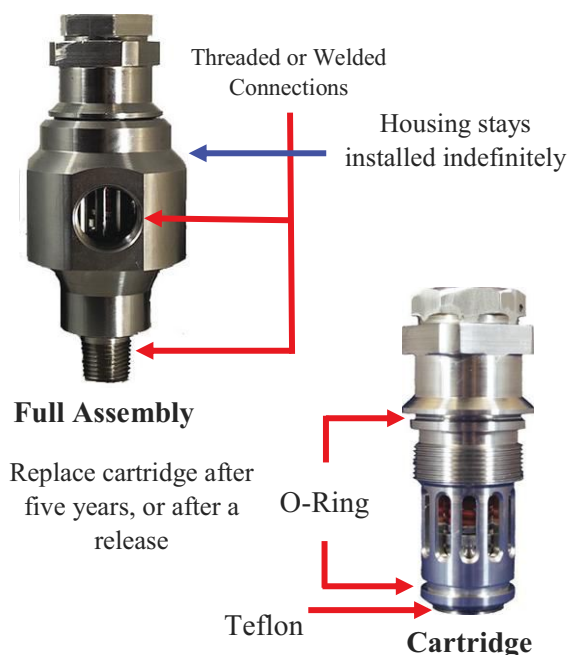


valve is active before replacing it. With new pressure loss concerns, valve coefficient, or Cv, of a manifold will help aid in determining the correct valve for the application. The higher the Cv, the easier it is for vapor or liquid to flow through the manifold to the relief valve. Between manufacturers, most components are similar in terms of purpose, but functionality and materials used differentiate each company's products. As innovations continue to improve the industry, the basic internal components stay the same.

Over the past decade, cartridge-style relief valves have entered the market, with growing market share. Most manufacturers offer their own style of two-piece valves. The ideology behind the cartridge relief valves is that it creates a safer, serviceable and more robust option to the single-piece relief valve. This newer version comes in two separate parts: a housing and an insert. The housing will stay threaded, or welded, into the manifold and outlet piping indefinitely. The insert is the shelter for all of the internal components that make a relief valve. When it is time to replace the relief valve after five years, or upon early release, the insert is the only object that needs to be replaced. Therefore, a primary advantage to the two-piece valve is the elimination of any future piping hassle and decreased change out time (at least 50 percent per relief valve).

At this time, there have been tens of thousands of two-piece relief valves sold by valve manufacturers, likely due to rising awareness for a safer, simpler solution. A few of the manufacturers have had their cartridge-style relief valves certified under the same certification number with the

## *Two-Piece Relief Valve*



**Over the past decade, cartridge-style relief valves have become widely used. Most manufacturers offer their own style of these two-piece valves because they create a safer, more serviceable and more robust option to the single-piece relief valve.**

National Board of Boiler and Pressure Vessels as single-piece option. Therefore, each style relief valve is certified to have the same slope, which eliminates any recalculations that would need to be done prior to switching over from a single-piece valve to a new cartridge style relief valve.

Corrosion awareness has always been a concern in the food and beverage industry. A traditional solution would be to paint a valve every six months, noting that it already comes from the manufacturer painted, black oxide coated, anodized, etc. The redundancy might seem like overkill, but rust is a living organism that will quickly eat away at material. Valves are designed to last up

to five years, but corrosion could shorten the lifetime. Therefore, valve manufacturers have brought to the market their version of corrosion resistance: Using the same ductile iron material with corrosion-resistant coatings or changing the housing material to stainless steel. Depending on the application and geographical location, each solution seems to have a high corrosion resistance. These corrosion-resistance solutions are even applied to manifolds. The goal is eliminating the potential for rust, not managing it after it has already manifested. With current knowledge, both solutions appear to be extremely corrosion-resistant and will help the valve stay safe throughout its lifetime.

Relief valve manufacturers continue to adapt to the ongoing needs of today's industry while always keeping safety as the highest priority. Competition brings

innovation; therefore, there are a handful of different inventions that come from all relief valve manufacturers each year, and each idea is better than the next. Even though safety-relief valves and manifolds are a small portion of a system, they are the most crucial part to everyday safety and functionality.

Myriad of product-specific upgrades exist that will help create a safer environment for process facilities, and those touched upon are just the tip of the iceberg. It is easy to purchase what was installed on a system five years ago, but that was yesterday's technology. Invest time to educate on new product releases that directly affect staff and equipment. **PC**

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## Monitor Flow Measurement Control

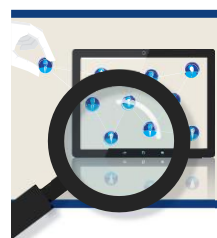


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